



## NEW DRUG APPROVALS

### Farydak for Multiple Myeloma

The FDA has approved panobinostat (Farydak, Novartis) to treat multiple myeloma (MM), which kills more than 10,000 mostly older Americans a year.

Panobinostat inhibits the activity of histone deacetylases, which may slow the overdevelopment of plasma cells or cause these cells to die. Panobinostat is intended for patients who have received at least two prior standard therapies, including bortezomib chemotherapy and an immunomodulatory agent. Panobinostat is to be used in combination with bortezomib and dexamethasone, an anti-inflammatory medication.

In November 2014, the FDA's Oncologic Drugs Advisory Committee concluded that, based on the data reviewed, the drug's benefits did not outweigh its risks for patients with relapsed MM. After the meeting, the company submitted additional information supporting the indication for panobinostat that was eventually approved.

Panobinostat's safety and efficacy in combination with bortezomib and dexamethasone were demonstrated in 193 clinical trial participants with MM who received at least two prior treatments that included bortezomib and an immunomodulatory agent. Subjects were randomly assigned to receive a combination of panobinostat, bortezomib, and dexamethasone, or bortezomib and dexamethasone alone.

Among participants receiving the panobinostat combination, progression-free survival was 10.6 months, compared with 5.8 months among patients treated with bortezomib and dexamethasone alone. In addition, 59% of panobinostat-treated participants saw their cancer shrink or disappear after treatment, compared with 41% of those receiving bortezomib and dexamethasone.

Farydak carries a boxed warning of

severe diarrhea and severe and fatal cardiac events, arrhythmias, and electrocardiogram changes. The medication was approved with a risk evaluation and mitigation strategy.

The most common adverse effects included diarrhea, tiredness, nausea, swelling in the arms or legs, decreased appetite, fever, vomiting, and weakness. The most common laboratory abnormalities included hypophosphatemia, hypokalemia, hyponatremia, increased creatinine levels, thrombocytopenia, leukopenia, and anemia. Health care professionals should also inform patients of the risk of bleeding in the gastrointestinal tract and the lungs and the risk of hepatotoxicity.

An improvement in survival or disease-related symptoms has not yet been established for panobinostat; Novartis must conduct confirmatory trials to verify and describe its clinical benefits.

Source: FDA, February 23, 2015

### Antibacterial Avycaz

The antibacterial medication ceftazidime/avibactam (Avycaz, Actavis) has won FDA approval for the treatment of adults with complicated intra-abdominal infections (cIAIs), in combination with metronidazole, and adults with complicated urinary-tract infections (cUTIs), including pyelonephritis, who have limited or no alternative treatment options.

Specifically, ceftazidime/avibactam with metronidazole is indicated for the treatment of cIAIs caused by *Escherichia coli*, *Klebsiella pneumoniae*, *Proteus mirabilis*, *Providencia stuartii*, *Enterobacter cloacae*, *Klebsiella oxytoca*, and *Pseudomonas aeruginosa*. It is indicated for the treatment of cUTIs, including pyelonephritis, caused by *E. coli*, *K. pneumoniae*, *Citrobacter koseri*, *E. cloacae*, *E. aerogenes*, *Citrobacter freundii*, *Proteus* species, and *P. aeruginosa*.

The FDA's approval of Avycaz was based in part on efficacy and safety find-

ings with ceftazidime in treating cIAIs and cUTIs. The contribution of avibactam was assessed based on *in vitro* studies and animal models of infection. Avycaz was studied in two phase 2 trials, one each in cIAIs and cUTIs.

Ceftazidime is a previously approved cephalosporin with *in vitro* activity against some gram-negative and gram-positive bacteria. Avibactam is a new non-beta-lactam beta-lactamase inhibitor. Adding avibactam to ceftazidime protects ceftazidime from breakdown by extended spectrum beta-lactamases, *K. pneumoniae* carbapenemase, and AmpC-producing pathogens.

The most common adverse effects associated with ceftazidime/avibactam include vomiting, nausea, constipation, and anxiety. Decreased efficacy, seizures, and other neurological events were seen in patients with renal impairment. Serious skin reactions and anaphylaxis may occur in patients with penicillin allergies.

Avycaz is the fifth approved antibacterial drug designated as a qualified infectious disease product under the FDA's Generating Antibiotic Incentives Now program; it received a priority review.

Sources: FDA, February 26, 2015, and Actavis, February 25, 2015

### Once-Daily Basal Insulin Toujeo

The FDA has approved insulin glargine (rDNA origin) injection, 300 U/mL (Toujeo, Sanofi), a once-daily, long-acting basal insulin, to improve glycemic control in adults with type-1 and type-2 diabetes.

The product labeling, however, could complicate marketing, according to Reuters. Analysts noted that some potential benefits of Toujeo are not mentioned in the label, which highlights the need for higher doses to achieve the same level of glycemic control provided by Lantus (insulin glargine [rDNA origin] injection, Sanofi). Toujeo has the same active ingredient as Lantus but at three times the



concentration; it is designed to release the insulin more gradually.

Toujeo's approval was based on the EDITION program, a series of phase 3 trials evaluating the product's efficacy and safety in more than 3,500 adults. Once-daily Toujeo (300 U/mL) was compared with once-daily Lantus (100 U/mL) in open-label, randomized, active-control, parallel-group, treat-to-target studies that lasted up to 26 weeks with a six-month safety extension.

Toujeo and Lantus demonstrated similar blood sugar control. The most common adverse events (excluding hypoglycemia) reported for Toujeo included nasopharyngitis and upper respiratory tract infections.

Toujeo will be available in the Toujeo SoloSTAR, a disposable prefilled pen that contains 450 units of Toujeo. This pen requires one-third of the injection volume to deliver the same number of insulin units as the Lantus SoloSTAR. The maximum single-injection dose of 80 IU meets the needs of most U.S. patients requiring basal insulin.

Sources: Sanofi, February 25, 2015, and Reuters, February 26, 2015

### Unituxin for Neuroblastoma

Dinutuximab (Unituxin, United Therapeutics) has received FDA approval as part of first-line therapy for pediatric patients with high-risk neuroblastoma.

Neuroblastoma is a rare cancer that forms from immature nerve cells, typically in children younger than 5 years of age. Patients with high-risk neuroblastoma have only a 40% to 50% chance of long-term survival despite aggressive therapy.

Dinutuximab, an antibody that binds to the surface of neuroblastoma cells, has been approved for use in a multimodality regimen—including surgery, chemotherapy, and radiation therapy—for patients who have achieved at least

a partial response to prior first-line multiagent, multimodality therapy. The FDA granted dinutuximab priority review and orphan product designations.

Dinutuximab's safety and efficacy were evaluated in a clinical study of 226 children with high-risk neuroblastoma whose tumors shrank or disappeared after treatment with multiple-drug chemotherapy and surgery followed by additional intensive chemotherapy, and who subsequently received bone marrow transplantation support and radiation therapy.

Children were randomly assigned to receive either dinutuximab in combination with interleukin-2 and granulocyte-macrophage colony-stimulating factor, which are thought to enhance the activity of dinutuximab by stimulating the immune system, or an oral retinoid drug, isotretinoin (RA), alone. Three years after treatment, 63% of the subjects in the dinutuximab combination group were alive and free of tumor growth or recurrence compared with 46% of the RA group.

The labeling for dinutuximab includes a boxed warning noting that the drug irritates nerve cells, causing severe pain that requires treatment with intravenous narcotics, and can also cause nerve damage and life-threatening infusion reactions, including upper-airway swelling, difficulty breathing, and hypotension, during or shortly after infusion. Dinutuximab may also cause other serious adverse effects, including infections, eye problems, electrolyte abnormalities, and bone marrow suppression.

The most common adverse effects included severe pain, fever, low platelet counts, infusion reactions, hypotension, hyponatremia, elevated liver enzymes, anemia, vomiting, diarrhea, low potassium levels in the blood, capillary leak syndrome, neutropenia, lymphopenia, hives, and low blood calcium levels.

Source: FDA, March 10, 2015

### Cresemba for Invasive Aspergillosis, Mucormycosis

The FDA has approved the azole antifungal isavuconazole (Cresemba, Basilea Pharmaceutica/Astellas) to treat invasive aspergillosis and invasive mucormycosis in patients 18 years of age or older.

The safety and efficacy of isavuconazole (the active agent of the prodrug isavuconazonium sulfate) were determined in two phase 3 clinical trials.

In SECURE, a randomized, double-blind, active-control study of patients with invasive aspergillosis, isavuconazole demonstrated noninferiority to voriconazole for all-cause mortality in the treatment of invasive aspergillosis or other filamentous fungi in 516 patients. All-cause mortality through day 42 was 18.6% in the isavuconazole group compared with 20.2% in the voriconazole group.

In VITAL—an open-label, noncomparative study of isavuconazole in patients who had invasive aspergillosis and renal impairment or who had invasive fungal disease caused by other fungi, including those causing mucormycosis—the all-cause mortality rate was 38%.

The most common adverse events for patients treated with isavuconazole in both trials included nausea, vomiting, diarrhea, headache, elevated liver chemistry tests, hypokalemia, constipation, dyspnea, cough, peripheral edema, and back pain.

Invasive aspergillosis is a life-threatening fungal infection that predominantly affects immunocompromised patients. Invasive mucormycosis (also known as zygomycosis) is a rapidly progressing and life-threatening invasive fungal infection. Both diseases are known for high morbidity and mortality.

Source: Basilea Pharmaceutica, March 6, 2015



## Generic, Biosimilar Approvals

### First Biosimilar, Zarxio (Filgrastim-sndz)

The FDA has made Zarxio (filgrastim-sndz, Sandoz) the first biosimilar product approved in the U.S.

A biosimilar is a biological product (one based on living cells) that is approved based on evidence that it is highly similar to an already-approved biological reference product. The biosimilar must be shown to have no clinically meaningful differences in safety and effectiveness from the reference product.

As a biosimilar to Neupogen (filgrastim, Amgen), Zarxio is approved for the same indications: cancer patients receiving myelosuppressive chemotherapy; acute myeloid leukemia patients receiving induction or consolidation chemotherapy; cancer patients undergoing bone marrow transplantation; patients undergoing autologous peripheral-blood progenitor cell collection and therapy; and patients with severe chronic neutropenia.

Under the Biologics Price Competition and Innovation Act (BPCIA), the FDA can approve a biosimilar product if it has the same mechanism of action, route of administration, and dosage forms and strengths as the reference product. The FDA reviewed evidence that included Zarxio's structural and functional characterization, animal study data, human pharmacokinetic and pharmacodynamic data, clinical immunogenicity data, and other clinical safety and effectiveness data, all of which demonstrated that Zarxio is biosimilar to Neupogen.

Zarxio was approved as a biosimilar product, not an interchangeable product. Under the BPCIA, an "interchangeable" biological product may be substituted for the reference product without consulting the health care provider who prescribed the reference product.

The FDA used "filgrastim-sndz" as a "placeholder" nonproprietary name.

Source: FDA, March 6, 2015

### Miglitol for Diabetes

The FDA has approved the marketing of 25-mg, 50-mg, and 100-mg miglitol tablets by Orient Pharma Co., Ltd. This is the first generic version of Pharmacia and Upjohn's Glyset, an oral alpha-glucosidase inhibitor used in the management of non-insulin-dependent diabetes mellitus.

Sources: FDA, February 24, 2015, and Glyset prescribing information

### Chewable Methylphenidate HCl

Novel Laboratories, Inc., has received FDA approval to sell methylphenidate hydrochloride chewable tablets in 2.5 mg, 5 mg, and 10 mg—the first generic version of Mallinckrodt's Methylin chewable tablets, a mild central nervous system stimulant indicated to treat attention deficit disorders and narcolepsy.

Sources: FDA, February 25, 2015, and Methylin prescribing information

## NEW INDICATIONS

### Opdivo for NSCLC

The FDA has approved nivolumab injection (Opdivo, Bristol-Myers Squibb) for intravenous (IV) treatment of patients with metastatic squamous non-small-cell lung cancer (NSCLC) that has progressed on or after platinum-based chemotherapy.

Nivolumab is the first programmed death receptor-1 (PD-1) therapy to demonstrate overall survival (OS) in patients with previously treated metastatic squamous NSCLC. The treatment achieved significantly superior OS compared with docetaxel. Nivolumab was approved in December 2014 to treat patients with unresectable or metastatic melanoma who no longer respond to other drugs.

The latest approval was based on the multinational CheckMate-017 and CheckMate-063 trials.

CheckMate-017 was a phase 3, open-label, randomized study that evaluated nivolumab (3 mg/kg IV over 60 minutes every two weeks) in 135 patients com-

pared with standard-of-care docetaxel (75 mg/m<sup>2</sup> IV administered every three weeks) in 137 patients. Participants had metastatic squamous NSCLC that had progressed during or after a prior platinum doublet-based chemotherapy regimen, regardless of their programmed death ligand-1 status.

In January, the study was stopped based on an independent data-monitoring committee's assessment that the study had met its endpoint by demonstrating superior OS in patients receiving nivolumab compared with docetaxel.

Nivolumab is the first FDA-approved monotherapy in more than 15 years to demonstrate superior OS compared with standard of care in patients with previously treated metastatic squamous NSCLC. The median OS was 9.2 months in the nivolumab arm and 6.0 months in the docetaxel arm. The hazard ratio (0.59,  $P = 0.00025$ ) translates to a 41% reduction in the risk of death with nivolumab versus docetaxel.

Nivolumab's safety profile in squamous NSCLC patients was established in CheckMate-063, a phase 2, single-arm, open-label study among 117 patients with metastatic disease that had progressed after platinum-based therapy and at least one additional systemic regimen.

The most common adverse events (AEs) included fatigue, dyspnea, musculoskeletal pain, decreased appetite, cough, nausea, and constipation. Serious AEs occurred in 59% of patients receiving nivolumab, including dyspnea, pneumonia, exacerbation of chronic obstructive pulmonary disease, pneumonitis, hypercalcemia, pleural effusion, hemoptysis, and pain. Because of AEs, nivolumab was discontinued in 27% of patients and delayed in 29%.

With at least 10 months of follow-up for all patients, the confirmed objective response rate was 15% (17/117); all were partial responses. The median time to

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onset of a response was 3.3 months. Among the 17 responders, 13 (76%) had ongoing responses and 10 (59%) had durable responses of six months or longer.

Sources: Bristol-Myers Squibb, March 5, 2015, and FDA, March 4, 2015

### Rufinamide for Ages 1–4 Years

Rufinamide (Banzel, Eisai Inc.) has secured FDA approval as an adjunctive treatment for seizures associated with Lennox-Gastaut syndrome (LGS) in patients 1 to 4 years of age. The FDA approved rufinamide in 2008 for the adjunctive treatment of seizures associated with LGS in children ages 4 and older and in adults.

The latest approval was based on a pharmacokinetic bridging study of a phase 3 clinical trial that demonstrated the pharmacokinetic and safety profiles of rufinamide are consistent with those seen at ages 4 and above. This study compared rufinamide (45 mg/kg per day) adjunctive treatment to the adjunctive treatment with an antiepileptic drug of the investigator's choice in patients from 1 year to less than 4 years of age with inadequately controlled LGS. The adverse-reaction profile was generally similar to that seen in adults and pediatric patients 4 years of age and older treated with rufinamide.

Source: Eisai Inc., February 13, 2015

## DRUG NEWS

### Priority Review Status

#### LCZ696 for Heart Failure

Novartis announced that the FDA has granted priority review for LCZ696, an investigational medicine for the treatment of heart failure with reduced ejection fraction. The target FDA action date is in August 2015.

The LCZ696 application is based on results from the PARADIGM-HF study, which showed LCZ696 was superior to accepted guideline therapy with the

angiotensin-converting enzyme inhibitor enalapril on key endpoints. It reduced the risk of either cardiovascular death or heart failure hospitalization by 20%.

LCZ696, a twice-daily medicine, enhances the protective neurohormonal systems of the heart while suppressing the harmful effects of the overactive renin-angiotensin-aldosterone system. Currently available medicines for heart failure with reduced ejection fraction only block the harmful effects and mortality remains high; up to 50% of patients die within five years of a diagnosis of heart failure.

Source: Novartis, February 13, 2015

### Orphan Drug Designations

#### Reolysin for Fallopian Tube Cancer

The FDA has granted an orphan drug designation to Reolysin (Oncolytics Biotech, Inc.), for the treatment of cancer of the fallopian tube. In February 2015, Reolysin received an orphan drug designation for ovarian cancer.

Reolysin is a proprietary variant of the widely found, nonpathogenic reovirus (respiratory enteric orphan virus). It has been used alone and in combination with chemotherapy and radiotherapy to treat various cancers. Clinical research has shown that the reovirus can infect and selectively destroy cancer cells.

An ongoing, randomized phase 3 trial is comparing weekly paclitaxel and Reolysin to weekly paclitaxel alone in patients with persistent or recurrent ovarian, fallopian tube, or primary peritoneal cancer.

Source: Oncolytics Biotech, March 2, 2015

#### Doxorubicin Option for Ewing's Sarcoma

The FDA has given an orphan drug designation to antinuclear antibody (ANA) conjugated liposomal doxorubicin (NanoSmart Pharmaceuticals, Inc.) to treat Ewing's sarcoma, a rare cancer that develops in or around children's bones.

The product focuses drug delivery at the tumor site. Nonclinical testing has been "very promising," the company says, revealing a potential to improve the safety and efficacy of liposomal doxorubicin. ANA conjugation enables the drug to bind to areas of necrosis that are present in solid tumors. NanoSmart anticipates expanding into additional pediatric indications.

Source: NanoSmart Pharmaceuticals, Inc., February 11, 2015

### Flu Vaccine Recommendation

The Advisory Committee on Immunization Practices (ACIP) has abandoned last year's preference for using the nasal spray flu vaccine instead of the flu shot in healthy children 2 through 8 years of age.

The panel of advisors to the Centers for Disease Control and Prevention (CDC) continued to recommend that all persons 6 months of age and older be vaccinated annually against influenza. But the ACIP did not renew its 2014–2015 preference for using the nasal vaccine (live attenuated influenza virus [LAIV]) rather than the shot (inactivated influenza virus [IIV]) when the nasal spray is immediately available. The preferential recommendation was approved in June 2014 after a review of data from several influenza seasons suggested that the nasal spray vaccine could offer better protection than the flu shot for children in this age group.

The decision not to renew that recommendation was based on new data from more-recent seasons, which have not confirmed the superior effectiveness of LAIV seen in earlier studies. The ACIP recommends that children 6 months of age and older receive an annual influenza vaccine with no preference stated for either the nasal spray or the flu shot.

The ACIP recommendation must be considered by the CDC director.

Source: CDC, February 26, 2015



## Testosterone Labels Revised

Prescription testosterone products must receive new labels to clarify their approved uses—which do not include replenishing testosterone levels lowered solely by age, the FDA says. The agency is also requiring manufacturers to add information to labels about a possible increased risk of heart attacks and strokes in patients taking testosterone.

Testosterone is FDA-approved as replacement therapy only for men who have low testosterone levels because of disorders of the testicles, pituitary gland, or brain that cause hypogonadism. However, the agency has learned that testosterone is being used extensively in attempts to relieve symptoms in men who have low testosterone for no apparent reason other than aging. The medications' benefit and safety have not been established for the treatment of low testosterone levels due to aging, even if a man's symptoms seem related to low testosterone.

Based on evidence from clinical studies and expert input from an FDA advisory committee, the agency concluded that a possible increased cardiovascular risk is associated with testosterone use. These studies included aging men treated with testosterone. Some studies reported an increased risk of heart attack, stroke, or death associated with testosterone treatment, while others did not.

Health care professionals should prescribe testosterone therapy only for men with low testosterone levels caused by appropriate medical conditions and confirmed by laboratory tests, the FDA says. Health care professionals should tell patients of the possible risks when deciding whether to start or continue testosterone therapy.

Testosterone prescriptions have increased dramatically among men more than 40 years of age in the past decade as they seek to increase muscle tone and sex

drive. A new University of Texas Medical Branch study of more than 61,000 men with testosterone prescriptions found that 20% received those prescriptions despite having normal testosterone levels based on Endocrine Society guidelines. The analyses also showed that 25% of men included in the study did not have their testosterone levels checked before receiving a prescription and that nearly half did not have their levels checked during the first year of treatment.

Sources: FDA and University of Texas Medical Branch, March 3, 2015

## Chantix Warnings Expanded

The smoking-cessation medication varenicline (Chantix, Pfizer) can change the way people react to alcohol and on rare occasions has been linked with seizures, warns the FDA, which has approved changes to the Chantix label. Until patients know how varenicline affects their ability to tolerate alcohol, they should drink less alcohol.

The FDA reviewed a case series submitted by Pfizer and cases from the FDA Adverse Event Reporting System (FAERS) describing patients who drank alcohol during treatment with Chantix and experienced adverse events (AEs). Some patients experienced decreased tolerance to alcohol, including increased drunkenness and unusual or aggressive behavior, or they had no memory of events.

The FDA also reviewed FAERS and the medical literature for cases of seizures with varenicline. The agency identified cases in which the patients who had seizures while taking varenicline either had no history of seizures or had a seizure disorder that had been well-controlled. In most cases, these seizures occurred in the first month of varenicline use.

The FDA also updated the label to include information about studies that investigated the risk of neuropsychiatric

adverse effects on mood, behavior, or thinking during treatment with varenicline. This includes data from observational studies and Pfizer's analyses of randomized controlled clinical trials. These studies did not show an increased risk of neuropsychiatric AEs with varenicline, but the FDA did not examine all types of effects. Pfizer is conducting a large clinical safety trial of varenicline to investigate the risk of neuropsychiatric AEs; results are expected in late 2015.

Source: FDA, March 9, 2015

## Medication Recalls

### Sagent and Heritage Injectables

Two pharmaceutical companies recalled 19 lots of three injectable drugs after the FDA observed manufacturing problems that could affect sterility at Emcure Pharmaceuticals Ltd. Non-sterility of an intravenous drug could result in potentially fatal infections.

Sagent Pharmaceuticals, Inc., recalled six lots of atracurium besylate injection, USP: two lots of 50 mg/5 mL single-dose vials and four lots of 100 mg/10 mL multidose vials manufactured by Emcure and distributed by Sagent. The recalled lots are VATA012, VATA015 (both 50 mg/5 mL), VATB012, VATB013, VATB014, and VATB017 (all 100 mg/10 mL), which were distributed from February 2014 through February 2015. Sagent is now making the product in its own facility. Questions should be directed to Sagent's customer call center at 1-866-625-1618, Monday through Friday, from 8 A.M. to 7 P.M. Central time.

Heritage Pharmaceuticals Inc. recalled 10 lots of colistimethate for injection, USP, 150 mg single-dose vials, and three lots of rifampin for injection, USP, 600 mg single-dose vials, manufactured by Emcure and distributed by Heritage. Both products are sold in single-vial monocartons in case packs of 10. The colistimethate lots are VCOA002, VCOA003, VCOA004,



VCOA005, VCOA006, VCOA007, VCOA008, VCOA009, VCOA010, and VCOA011, and the rifampin lots are VR1A002, VR1A003, and VR1A004. The products were distributed from December 2012 through January 2015. Questions should be directed to the Heritage customer call center at 1-866-901-1230 from 9 A.M. to 5 P.M. Monday through Friday.

Source: FDA, February 24, 2015

### One Lot of Hospira Magnesium Sulfate

Hospira, Inc., recalled lot 42-120-JT of magnesium sulfate in 5% dextrose for injection, USP, 10 mg/mL (expiring in December 2015) because of an incorrect barcode on the primary bag labeling. The barcode on the overwrap is correct, but the primary container barcode may be mislabeled with the barcode for heparin sodium 2,000 USP units/1,000 mL in 0.9% sodium chloride injection. The product is labeled with the correct printed name on the primary container and overwrap.

The lot was distributed nationwide from October 2014 to January 2015. For assistance, call Stericycle at 1-866-382-9260 from 8 A.M. to 5 P.M. Eastern time, Monday through Friday.

Source: Hospira, Inc., March 6, 2015

### One Lot of Hospira Sodium Chloride

Hospira, Inc., recalled lot 45-110-C6 of 0.9% sodium chloride injection, USP, 250 mL VisIVflex container (expiring in March 2016) after a human hair was found in a single unit. The lot was distributed nationwide from December 2014 through January 2015. For assistance, call Stericycle at 1-888-714-5079 from 8 A.M. to 5 P.M. Eastern time, Monday through Friday.

Source: Hospira, Inc., March 5, 2015

## RESEARCH BRIEFS

### Are Doctors Underestimating The Risks of Acetaminophen?

Doctors may underestimate the risks for patients who take acetaminophen long-term, according to research published online in the *Annals of the Rheumatic Diseases*.

Acetaminophen, the world's most widely used analgesic, is recommended as first-line pharmacological therapy for numerous acute and chronic painful conditions. It is generally considered safer than other common analgesics.

United Kingdom researchers conducted a systematic review of studies that had assessed the association between chronic use of paracetamol (the European name for acetaminophen) and major adverse events (AEs) in adults. They identified eight suitable studies. Of two studies that showed mortality, one found a dose response and reported an increased relative mortality rate from 0.95 to 1.63 for increasing standard doses of paracetamol in patients who had been prescribed the drug compared with those who had not.

Of four studies reporting cardiovascular AEs, all showed a dose response, with one study reporting an increased risk ratio of all cardiovascular adverse events from 1.19 to 1.68. One study reporting gastrointestinal (GI) AEs noted a dose response with a higher relative rate of events or bleeds from 1.11 to 1.49. And of four studies reporting renal AEs, three reported a dose response, with one reporting a more likely decrease in the estimated glomerular filtration rate from 1.40 to 2.19.

The authors said the eight observational studies were likely to have biases related to people who needed long-term paracetamol (often people who already had multiple medical problems requiring other analgesics and medications). Still, they said, their findings demonstrated a consistent dose-response relationship between paracetamol at standard

analgesic doses and AEs typical of those often observed with nonsteroidal anti-inflammatory drugs.

The authors acknowledged that every prescribing decision entails a calculation of risk versus benefit or a trade-off of efficacy versus tolerability. "Based upon the data presented above, we believe the true risk of paracetamol prescription to be higher than that currently perceived in the clinical community," they concluded.

Sources: Medical Xpress and *Annals of the Rheumatic Diseases*, March 2, 2015

### Why Health Workers Won't Get Flu Shots

About 75% of health care professionals were vaccinated against influenza in the 2013–2014 season, according to the Centers for Disease Control and Prevention (CDC). The level was lowest—20%—in long-term care (LTC) facilities, even though research suggests outbreaks are linked to transmission from workers to often-older, high-risk patients.

The CDC says workers who did not get vaccinated cited fear of needles, worry about side effects, and concern about contracting the disease from the vaccine. Only 34% of the nonvaccinated who responded to a 2013 CDC survey agreed with the statement that "influenza is a serious threat to my health."

Researchers from Emory University surveyed vaccination rates and attitudes among 1,965 LTC employees in 37 Florida, Georgia, and Wisconsin nursing homes, none of which required vaccinations. The average vaccination rate across nursing homes was 55% (73% in Wisconsin, 59% in Georgia, and 36% in Florida).

Almost 40% of respondents disagreed with the statement "Vaccine does not cause influenza." Vaccinations were almost 30 percentage points higher among employees who believed the vaccine is effective and 12 points higher among those who believe it does not





cause the flu. For each 10-year increase in employees' age, the probability of vaccination increased by 4 percentage points.

Registered nurses were more likely to get vaccinated and nearly 16 percentage points more likely than nonclinical staff to agree that nursing home residents were at risk of contracting influenza.

According to the CDC, vaccination coverage during 2013–2014 was above 96% in all work settings where vaccination was required, including LTC settings. However, health care professionals working in LTC facilities were most likely to report that their employer neither required nor promoted vaccination, and least likely to report that their employer made vaccination available at no cost for multiple days.

Many LTC administrators interviewed for the study opposed vaccination mandates, saying they infringed on employees' autonomy. However, 11 facilities offered small incentives, such as a \$100 gift card raffle. Incentives increased the probability of receiving the vaccine by 12.3 percentage points.

Sources: *American Journal of Infection Control*, February 2015, and CDC, September 19, 2014

## Inflammation, IBD, and the Heart

Researchers from Harvard University and NewYork–Presbyterian Hospital say inflammation could explain why steroids reduced the risk of acute coronary syndrome (ACS) by 82% among patients with inflammatory bowel disease (IBD).

Their study compared the incidence of myocardial infarction or unstable angina in 177 IBD patients. Of 118 patients without ACS, 58% were using or had used steroids. By contrast, among 59 patients who had ACS, 34% used steroids.

The risk reduction with steroids held true after the researchers adjusted for diabetes, dyslipidemia, smoking, family history of heart disease, body mass index, aspirin use, and white blood cell

count. The risk was reduced regardless of IBD type. Use of other IBD medications did not affect the development of ACS.

Whether and how long to use steroids is a complex decision, since excessive exposure can lead to adverse metabolic, endocrine, and neuropsychiatric side effects. Screening for risk stratification and treatment of cardiovascular risk factors are paramount in these patients, the researchers say. They advocate “prudent and judicious” use of corticosteroids to maximize the cardioprotective and other benefits while minimizing side effects.

Source: *American Journal of Medicine*, March 2015

## Too Much Face Time?

Medical students touched their faces an average of 23 times an hour in a study at the University of South Wales—and nearly half of those touches involved contact with a mucous membrane.

Over 240 minutes, the 26 participants were observed touching their faces or hair 2,346 times, with contact lasting from 1 to 12 seconds. Roughly one-third of the touches were to the mouth, one-third to the nose, and one-third to the eyes.

Infections can be transmitted by self-inoculation, the researchers note, and approximately 25% of the population carries long-lived *Staphylococcus aureus* in the nasal mucosa. Another recent study found that, of 11,312 oral and perioral specimens, 1,986 contained *S. aureus*, and 10% were methicillin resistant.

Hand hygiene is the obvious answer, but the researchers add that stethoscopes and other medical equipment could be contaminated by pathogens that travel from nose to hand to instrument. They offer a reminder that it's important to clean up before and after using equipment.

Sources: *American Journal of Infection Control*, February 2015 and January 2015

## Oxycodone Versus Morphine

There's no significant difference between oxycodone and morphine for treating cancer pain, according to a study by British researchers. In terms of analgesic response or adverse reactions, either is fine as first- or second-line therapy.

Their 200-patient randomized study compared the two drugs as first-line treatment in opioid-naïve patients with cancer-related pain. The researchers designed the study to mirror real life, in which physicians base decisions about the adequacy of pain control, the tolerability of side effects, dosing, and switching on the patient's subjective experience. In other words, if a patient thinks his or her analgesia is inadequate or an adverse effect is intolerable, action is taken regardless of the patient's symptom score.

The researchers found no significant difference in the proportion of patients who responded to either drug (62% for morphine, 67% for oxycodone) as first-line opioid. Nor was there a significant difference in response rate when patients were switched to either drug. There was, however, a “marked” variation among individuals' responses to both oral morphine and oral oxycodone. This is on par with research arguing for “personalized prescribing”—choosing the right opioid at the right dose for each patient before treatment.

There are two ways to interpret their findings, the researchers say. One is to assign equal roles to both drugs as strong first-line opioids. Another is that cost-effectiveness and availability mean morphine should remain the recommended first choice. But, they add, having a choice of more than one opioid improves overall clinical outcomes in treating cancer pain. About 30% of patients do not receive adequate analgesia or have intolerable adverse effects with morphine. Moreover, 70% to 90% of cancer patients don't respond well to their first-line opioid but do better when switched to an alternative opioid.



In this study, the median time to switching was seven days for both groups; drowsiness, confusion, and hallucinations were common reasons for switching. The researchers say that may support switching to an alternative opioid early. A few patients did not respond to the second-line opioid. Switching to a third may still be beneficial, the researchers say, and interventional pain-management techniques should be considered.

Source: *Journal of Pain and Symptom Management*, February 2015

### VAP Surveillance Inconsistent

Diagnosing ventilator-associated pneumonia (VAP) can be tricky: Many conditions can mimic it, say researchers from Chi Mei Medical Center in Taiwan. Moreover, conventional definition of VAP relies on clinical, radiological, and microbiological findings that different clinicians may interpret differently.

In 2013, the Centers for Disease Control and Prevention (CDC) and the National Healthcare Safety Network developed a new approach to surveillance for ventilator-associated events (VAEs). The new algorithm defines VAEs with a combination of “objective, streamlined, and potentially automatable criteria,” including deterioration in respiratory status after a period of stability or improvement on the ventilator.

But does the new method outperform the old? In a retrospective study analyzing 165 episodes of VAP, the researchers compared it with conventional paradigms and found novel VAE surveillance detected only 33% of conventional VAP cases. This suggests that the concordance between the new algorithm and conventional VAP surveillance is poor, according to the researchers, who advise more studies to validate VAE surveillance.

Sources: *American Journal of Infection Control*, February 2015, and CDC, January 2015

### Readmission After Pneumonia

The highest risks for readmission and death after pneumonia come soon after hospital discharge, but the risk doesn't disappear afterward, say researchers from Columbia University, Yale-New Haven Hospital, Yale University, and Harvard School of Public Health. Findings from a study of more than 3 million patients with heart failure, acute myocardial infarction (AMI), and pneumonia suggest that patients “should remain vigilant for deterioration in health well beyond the first month after hospital discharge.”

The study was designed to define trajectories of risk for a full year after hospitalization. Those risks varied according to diagnosis: For instance, it took 25 days for the risk of first readmission to decline 50% for pneumonia, and 10 days for risk of death to decline 50%. By contrast, risk of readmission declined 50% by day 38 for heart failure and by day 13 for AMI. The number of days required for the daily change in risk of first readmission to decline 95% from its maximum daily decline was 45 days for pneumonia, 38 for AMI, and 45 for heart failure.

Daily risks of first readmission and death reached plateaus of minimal day-to-day change by seven weeks after hospitalization for all three conditions. A key finding, the researchers say, is that patients remain at increased risk of acute health events much longer than they are at their highest risk of death. Depending on diagnosis, the risk of readmission declined 50% within 13 to 39 days, whereas a similar decline in risk of death required only six to 12 days.

Source: *BMJ*, February 2015

### Gallbladder Disease and Cancer

Researchers from Taipei Veterans General Hospital in Taiwan have identified cancer risks following cholecystitis.

In their retrospective study of 20,431 cholecystitis patients, the researchers

documented 1,541 cancers (mostly liver, colorectal, lung, extrahepatic biliary, and gastric cancers) during a median 5.4 years of follow-up. Among patients with cholecystitis, hazard ratios (HRs) for liver cancer, biliary tract cancer, and pancreatic cancer were significantly higher. But after adjusting for other demographic characteristics and comorbidities, cholecystitis was an independent risk factor for biliary tract cancer—doubling the risk, particularly for extrahepatic biliary cancer. Men younger than 60 years old had the greatest risk of developing cancer. The increased risk persisted after five years of follow-up.

While the findings supported the elevated risk for biliary tract cancer in patients who had had cholecystectomy, that risk was reduced after the researchers controlled for other risk factors. Their results suggested that, in fact, cholecystectomy markedly lowered the risk (the HR dropped from 2.34 to 1.28), perhaps because cholecystectomy alleviated inflammation.

Source: *American Journal of Medicine*, February 2015

### DEVICE NEWS

#### Duodenoscope Design May Impede Cleaning

The complex design of endoscopic retrograde cholangiopancreatography (ERCP) endoscopes—also called duodenoscopes—may impede effective reprocessing, the FDA warns.

Reprocessing is a multistep procedure to clean and disinfect or sterilize reusable devices. According to the FDA, recent medical publications and adverse-event reports have associated multidrug-resistant bacterial infections in patients who have undergone ERCP with reprocessed duodenoscopes, even when manufacturers' reprocessing instructions are followed correctly. Meticulously cleaning duodenoscopes before high-level disin-





fection should reduce the risk of transmitting infection but may not entirely eliminate it, the FDA says.

The agency is closely monitoring the association between reprocessed duodenoscopes and the transmission of infectious agents, including multidrug-resistant bacterial infections caused by carbapenem-resistant *Enterobacteriaceae* (CRE), such as *Klebsiella* species and *Escherichia coli*. From January 2013 through December 2014, the FDA received 75 medical-device reports related to possible microbial transmission from reprocessed duodenoscopes.

Recently, the University of California at Los Angeles reported that more than 100 patients may have been exposed to CRE from contaminated duodenoscopes at its Ronald Reagan Medical Center after similar outbreaks at hospitals across the country.

Duodenoscopes are flexible, lighted tubes that are threaded through the mouth, throat, and stomach into the top of the duodenum. They contain a hollow channel that allows the injection of contrast dye or the insertion of other instruments to obtain tissue samples for biopsy or to treat certain abnormalities.

The FDA's recommendations for health care providers include the following:

- Inform patients of the benefits and risks associated with ERCP procedures.
- Tell patients what they should expect after the procedure and what symptoms (such as fever or chills, chest pain, severe abdominal pain, trouble swallowing or breathing, nausea and vomiting, or black or tarry stools) should prompt additional follow-up.
- Consider taking a duodenoscope out of service until it has been verified to be free of pathogens if a patient develops an infection with a multidrug-resistant organism after ERCP,

and suspect that there may be a link between the duodenoscope and the infection.

- Submit a report to the manufacturer and the FDA if it is suspected that problems with reprocessing a duodenoscope have led to infections.

Source: FDA, February 19, 2015

### Lixelle Device to Treat Dialysis-Related Amyloidosis

The FDA has authorized the use of the Lixelle beta 2-microglobulin apheresis column (Kaneka Pharma America), the first device to treat dialysis-related amyloidosis (DRA).

DRA, a complication of kidney failure, is a chronic, progressive condition caused by the buildup of beta 2-microglobulin proteins. Deposits of the protein can form in bones, joints, and tendons, causing painful and stiff joints, bone cysts that can lead to bone fractures, and torn tendons and ligaments. The deposits can affect the digestive tract and other organs. DRA occurs most often in adults more than 60 years of age who have been on hemodialysis for more than five years.

The Lixelle column removes beta 2-microglobulin from the blood. It contains porous cellulose beads designed to bind to beta 2-microglobulin as blood passes over them. The device is used in conjunction with hemodialysis. The blood passes through the Lixelle column before it enters the dialysis filter.

The FDA reviewed the Lixelle column through the humanitarian device exemption (HDE) pathway after granting it a humanitarian use device designation.

Data supporting the safety and probable benefit of the Lixelle column include published clinical studies describing treatment of approximately 100 Japanese patients with DRA and post-marketing safety data from approximately 200 Japanese patients in whom the device had

been approved for use. The studies generally showed an improvement in DRA symptoms with use of the device.

The most common adverse events associated with use of the column included temporary hypotension and a decrease in the hematocrit count—both common in patients undergoing dialysis or any extracorporeal therapy. As a condition of the HDE approval, the manufacturer must conduct a post-marketing study to obtain more information on the benefits, risks, and adverse events associated with the Lixelle column in U.S. patients.

Source: FDA, March 6, 2015

### FDA Allows Ebola Test Use

The FDA has authorized emergency use of the ReEBOV antigen rapid test (Corgenix Medical Corp.) for the presumptive detection of Ebola Zaire virus—detected in the 2014 West Africa outbreak—in individuals with signs and symptoms of Ebola virus infection (EVI) in conjunction with epidemiological risk factors, including geographic locations with a high prevalence of EVI.

The ReEBOV test is a point-of-care assay that can be used in any clinical facility adequately equipped for and capable of such testing, or in any field laboratory with trained personnel. The test can diagnose suspected Ebola cases in 15 to 25 minutes. The World Health Organization has listed the ReEBOV test for procurement, making it available to the health care community worldwide. It is not intended for general EVI screening, such as airport screening or contact tracing.

EVI and other viral hemorrhagic fevers are difficult to identify because many of the early signs and symptoms are non-specific and common to other infectious diseases, such as Dengue fever, Lassa fever, typhoid, and malaria.

Source: Corgenix Medical Corp., February 26, 2015



### Bloom Syndrome Genetic Test

The FDA has authorized marketing of the 23andMe Personal Genome Service Carrier Screening Test for Bloom Syndrome (23andMe, Inc.), a direct-to-consumer genetic test to determine whether a healthy person has a variant in a gene that could lead to their offspring inheriting this serious disorder. The FDA added that it is classifying carrier screening tests as class II and intends to exempt them from FDA premarket review.

Bloom syndrome is a rare disorder that is more common in people of Ashkenazi Jewish background; about 1% are carriers. The disorder is characterized by a short stature, sun-sensitive skin changes, and an increased cancer risk. Bloom syndrome is inherited in an autosomal recessive pattern, which means that both copies of the gene in each cell have mutations.

This test is indicated for the detection of the BLMash variant in the *BLM* gene from saliva collected using an FDA-approved collection device. The test can be used to determine the carrier status for Bloom syndrome in adults of reproductive age, but it cannot determine whether a person has two copies of the BLMash variant. The test is most relevant for people of Ashkenazi Jewish descent.

Carrier testing is usually performed in people who show no symptoms of a genetic disorder but may be at risk for passing it to their children. A carrier for a genetic disorder has inherited one normal and one abnormal allele for a gene associated with the disorder. A child must inherit two abnormal alleles, one copy from each parent, for symptoms to appear. Given the probability of erroneous results and the rarity of these mutations, professional societies typically recommend that only prospective parents with a family history of a genetic disorder undergo carrier screening.

The FDA is requiring that the product labeling explain what the results might mean for prospective parents interested

in seeing whether they carry a genetic disorder. The FDA is also requiring 23andMe to tell consumers how to find a board-certified clinical molecular geneticist or equivalent to assist in pre- and post-test counseling.

Sources: FDA and 23andMe, Inc., February 19, 2015

### FDA: Don't Share Diabetes Pens

To reduce the risk of infections, the FDA is requiring label warnings that prohibit the sharing of multidose diabetes pens intended only for single-patient use.

Insulin pens and pens for other injectable diabetes medicines should never be shared among patients, the agency warns, even if the needle is changed. Sharing pens can spread serious infections from one patient to another. Since 2008, the agency has learned of thousands of patients possibly exposed to infections that are transmitted through blood from the sharing of such devices, although no confirmed cases of infection transmission have been reported.

The FDA is requiring that pens and packaging containing multiple doses of insulin and other injectable diabetes medicines display a warning label stating "For single patient use only" affixed to the pens and on the pen cartons. Additional warnings against sharing pens will be added to the prescribing information and to patient medication guides, patient package inserts, and instructions for use.

Source: FDA, February 25, 2015

### Device Recalls

#### Older Heartware Ventricular Assist System Controllers

HeartWare International, Inc., is recalling HeartWare Ventricular Assist System (VAS) controllers that were distributed during clinical trials because they are more susceptible to disruption by electrostatic discharge (ESD) than newer versions.

The HeartWare VAS helps deliver blood from the heart to the rest of the body in patients who are at risk of death from end-stage left ventricular heart failure and are awaiting a heart transplant. ESD can corrupt data in the controller that manages the pump's operation and cause the device to stop working, which could cause serious injury or death. Design enhancements to newer controllers improved resistance to ESD.

This recall covers HeartWare controllers with serial numbers CON000001 through CON005472, distributed from March 2006 to February 2014 during the ADVANCE and ENDURANCE clinical trials. HeartWare estimates that approximately 120 U.S. patients will be affected.

Patients can reduce the risk of ESD by avoiding dry environments; some fabrics and materials, such as silk clothing and carpeting; electronic devices prone to static electricity; and activities such as vacuuming and removing clothes from a dryer. Clinicians with questions about this class I recall should contact their HeartWare representative, call HeartWare's 24-hour Clinical Support line at 1-888-494-6365, or email [FSCA@heartware.com](mailto:FSCA@heartware.com).

Source: HeartWare International, Inc., February 20, 2015

### GE Healthcare MRI Systems

GE Healthcare has recalled nearly 13,000 magnetic resonance imaging (MRI) systems with magnet rundown units (MRUs) because some service personnel or equipment users may have disabled the MRUs, which are one way of closing down the magnetic field in an emergency. If metal enters the magnetic field, a shut-off delay may cause life-threatening injuries.

The FDA reports that two injuries occurred when hospital employees entered an MRI room carrying a metal container. GE Healthcare says the



MRU modifications took place in India.

The class I recall covers all GE Healthcare MRI systems with superconducting magnets distributed from 1985 to December 2014, including about 5,700 in the U.S. and 7,300 in other nations. GE Healthcare sent customers instructions on how to confirm that the MRU is connected; the company will correct affected systems at no cost to customers. Questions should be directed to local service representatives or the GE Healthcare customer service line at 1-800-437-1171, 24 hours a day, seven days a week.

Sources: FDA, February 25, 2015, and GE Healthcare, February 4, 2015

### Maquet Servo Humidifier 163

Teleflex Medical is recalling its Maquet Servo Humidifier 163 because of cracks in connectors and connector tubes. The device is placed over a tracheotomy or a tube inserted into the trachea to warm and moisten gases breathed by a patient. Cracks may cause oxygen and other gases to leak from the ventilator and prevent it from delivering sufficient support to the patient. A total of 118 devices were distributed from June 2013 through November 2014. For information about this class I recall, contact a Maquet representative at [fieldactions@maquet.com](mailto:fieldactions@maquet.com).

Source: FDA, February 25, 2015

### Hospira Infusion Systems

Hospira, Inc., is recalling 4,665 Plum A+ and A+3 infusion pumps because alarms may fail to sound when therapy is interrupted, potentially delaying the restoration of treatment. The devices were manufactured and distributed from July 2012 to May 2014. Lists of serial numbers are available at <http://tinyurl.com/HospiraPlum1> and <http://tinyurl.com/HospiraPlum2>. Questions about this class I recall should be directed to Stericycle at 1-888-912-7350, Monday through Friday, 8 A.M. to 5 P.M.

Source: FDA, March 6, 2015

## DEVICE SPOTLIGHT

### Kunj Gohil, PharmD, RPh

**Name:** Afrezza (Insulin Human)

**Manufacturer:** MannKind, Danbury, Connecticut, and Sanofi Aventis U.S., Bridgewater, New Jersey

**Launch Date:** February 3, 2015

**Purpose:** Afrezza is indicated to improve glycemic control in adults with diabetes mellitus. It is not a substitute for long-acting insulin in patients with type-1 diabetes mellitus; it is also not recommended for patients with diabetic ketoacidosis or for patients who smoke or have recently stopped smoking.

**Description:** Afrezza is a rapid-acting insulin that is administered through oral inhalation using the Afrezza inhaler. The Afrezza inhaler is a small, portable device that patients can carry for quick insulin administration. The insulin is provided as a powder in single-use cartridges.

**Benefit:** Diabetes is a chronic disease that affects millions of patients worldwide, with a portion of them requiring insulin for effective glycemic control. Traditional insulin is administered through frequent injections, but Afrezza provides a new administration route for patients. Inhaled insulin is designed to provide a faster-acting and more convenient formulation than currently marketed injections.

**Sources:** [www.fiercemedicaldevices.com](http://www.fiercemedicaldevices.com), [www.reuters.com](http://www.reuters.com), and Afrezza prescribing information

**Name:** VenaSeal Sapheon Closure System

**Manufacturer:** Covidien, Morrisville, North Carolina

**Approval Date:** February 23, 2015

**Purpose:** The VenaSeal system was developed for quick and effective treatment of venous reflux disease, also known as varicose veins.

**Description:** The system was designed to use a minimally invasive

technique with the help of ultrasound. A doctor begins by guiding a catheter to the diseased area of the vein through a small access site. Next, the VenaSeal dispenser delivers a very small volume of medical glue to close the vein. Blood is immediately rerouted to other healthy veins once the affected vein has been closed.

**Benefit:** Varicose veins are common in older patients and typically require invasive treatments. The VenaSeal system is the first treatment that does not require any anesthesia to be injected into the leg. In addition, this new system does not require any pre-procedure medications, allowing patients to return to their daily lives after the treatment. This system will provide patients with a safe and convenient option for their varicose veins.

**Sources:** [www.fiercemedicaldevices.com](http://www.fiercemedicaldevices.com) and [www.venaseal.com](http://www.venaseal.com)

**Name:** ResQCPR System

**Manufacturer:** Zoll Medical Corporation, Chelmsford, Massachusetts

**Approval Date:** March 9, 2015

**Purpose:** The ResQCPR System is a cardiopulmonary resuscitation (CPR) adjunct system that has been shown to improve the likelihood of survival in adults with nontraumatic cardiac arrest.

**Description:** The ResQCPR System consists of two devices designed to be used together. The ResQPump Active Compression CPR Device attaches to the patient's chest with a suction cup and has a double-grip handle to help the rescuer deliver compressions and decompressions; uniquely, there is a pressure gauge to allow the rescuer to maintain compression depth. The ResQPod 16.0 Impedance Threshold Device affixes to the rescue face mask or breathing tube and moderates airflow depending on whether a compression or decompression is being performed. Together, these two devices increase the amount of oxygenated blood circulated through the patient's body.

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**Benefit:** Many patients experience an out-of-hospital cardiac arrest, during which it is essential that CPR be performed immediately to keep oxygenated blood circulating. A pivotal trial, the ResQ-TRIAL, yielded a 49% increase in survival over conventional CPR methods. If this system is widely implemented, thousands of lives may be saved each year.

**Sources:** [www.fiercemedicaldevices.com](http://www.fiercemedicaldevices.com) and [www.zoll.com](http://www.zoll.com)

**Name:** StimRouter

**Manufacturer:** Bioness, Valencia, California

**Approval Date:** February 24, 2015

**Purpose:** StimRouter is an implantable neuromodulation device designed to treat chronic, intractable pain of peripheral nerve origin.

**Description:** The StimRouter is made up of multiple components, including an implanted lead, external pulse transmitter, and conductive electrode controlled by a small wireless unit. Once the device is implanted, electrical signals can be sent down the electrode to the origin of pain. Each system is individually programmed by a physician to target the patient's specific needs. Positive clinical results and ease of use make the StimRouter a viable alternative to current therapies.

**Benefit:** Millions of patients suffer from chronic pain every day. With traditional therapies consisting of injections, procedures, and ongoing medication regimens, there is a need for innovative pain-management options. The StimRouter is the only implantable device to be cleared by the FDA with a specific indication for peripheral nerve stimulation and may provide patients with a cost-effective alternative to conventional therapies.

**Sources:** [www.fiercemedicaldevices.com](http://www.fiercemedicaldevices.com) and [www.bioness.com](http://www.bioness.com) ■